H. H. BROWN.

ELECTRICALLY OPERATED STARTING DEVICE.

APPLICATION FILED JULY 27, 1907.

920,724. Patented May 4, 1909.

Fig. 2.

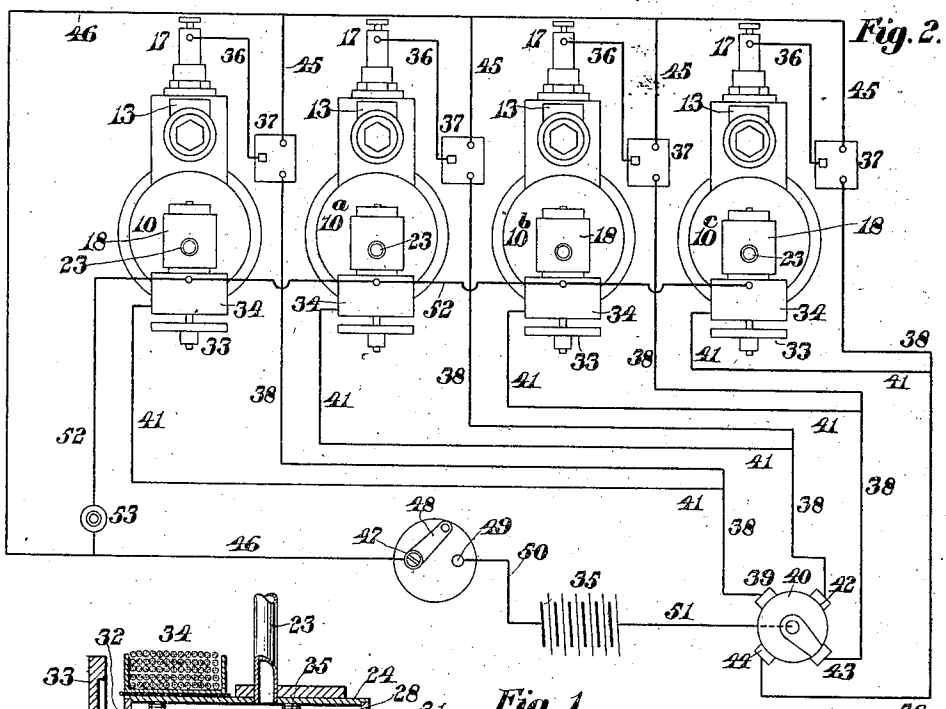
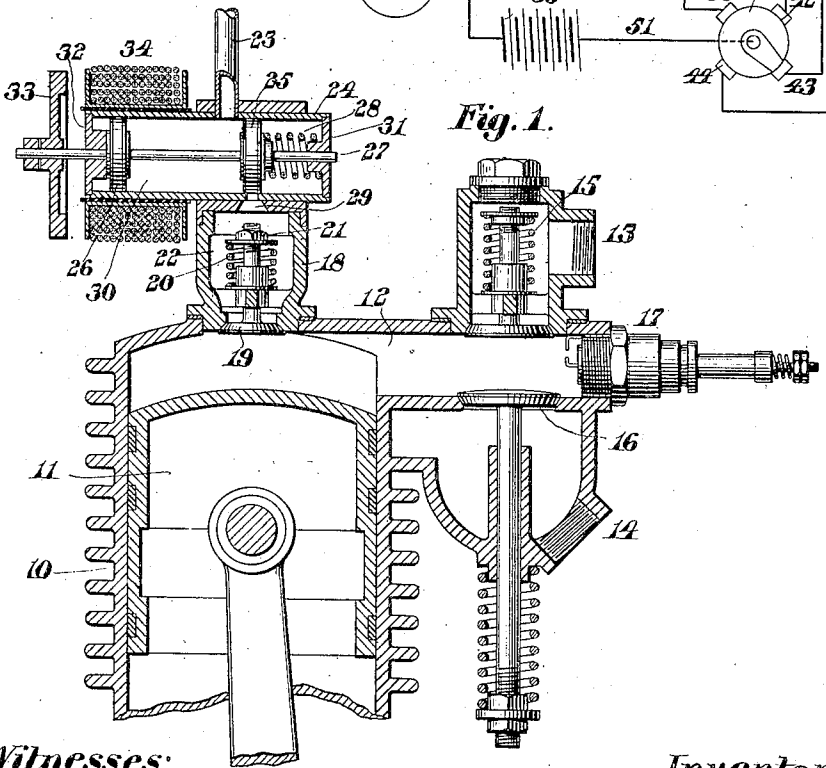


Fig. 1.



Witnesses:

Howard Hanscom

Nathan C. Lombard

Inventor:

Harold H. Brown,

by Watter & Lombard,

Atty.

UNITED STATES PATENT OFFICE.

HAROLD H. BROWN, OF BOSTON, MASSACHUSETTS.

ELECTRICALLY-OPERATED STARTING DEVICE.

No. 920,724. Specification of Letters Patent. Patented May 4, 1909.

Application filed July 27, 1907. Serial No. 385,804.

To all whom it may concern:

Be it known that I, HAROLD H. BROWN, a citizen of the United States of America, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electrically-Operated Starting Devices, of which the following is a specification.

This invention relates to an electrically controlled starting device for explosive engines by which the admission of compressed gas to a cylinder for the purpose of starting is regulated by means of a commutator in a suitable electric circuit, the current of which passes through a suitable device for controlling the admission of said gas to said cylinder at a predetermined time.

The invention further consists in suitable mechanism in which a current simultaneously operates an ignition device and an electrically controlled valve for regulating the admission of compressed air to the explosion chamber of the cylinder of the engine.

It consists further in certain novel features of construction and arrangement of parts which will be readily understood by reference to the description of the drawings and to the claims hereinafter given.

Of the drawings: Figure 1 represents a section of a portion of a cylinder of an explosive engine and the valve for controlling the admission of compressed gas thereto, and Fig. 2 represents a wiring diagram of a four-cylinder engine embodying the principles of this invention.

Similar characters designate like parts throughout the several figures of the drawings.

In the drawings, 10 represents a cylinder of an ordinary hydrocarbon explosive engine in which is adapted to reciprocate the piston 11 in any well-known manner. Communicating with the upper end of the cylinder 10 is the explosion chamber 12 having a hydrocarbon inlet 13 and an exhaust 14 of any well-known construction both the inlet and the exhaust passages being controlled by spring-operated valves 15 and 16.

An ignition plug 17 is screwed into the casing of the cylinder 10 and is adapted to create a spark at a predetermined time to explode the mixture contained within the chamber 12. The top of the cylinder 10 has secured thereto an extension 18 in which is mounted a valve 19 operated normally by the spring 20 to retain the valve 19 to its seat and prevent the escape of any of the explosive mixture from the chamber 12 when the explosion takes place. The spring 20 is regulated by means of the nut 21 so that when the tension of the gas confined within the chamber 22 in the extension 18 exceeds the tension of the spring 20 the valve 19 will be opened to permit the gas contained within said chamber 22 to pass into the explosion chamber 12.

The chamber 22 is supplied with gas under pressure from any suitable tank (not shown) through a pipe 23 between which and the chamber 22 is interposed the closed cylinder 24 having mounted therein a balanced valve consisting of two reciprocating pistons 25 and 26 secured to a piston rod 27. The piston 25 is normally retained in the position shown in the drawings by means of a spring 28 thereby closing the inlet 29 to the chamber 22 from the chamber 30 of said cylinder 24.

The piston rod 27 is mounted in bearings in the heads 31—32 of the cylinder 24 in which the said rod is adapted to reciprocate. One end of the piston rod 27 has secured thereto a metal disk or armature 33 which is adapted to be controlled by means of the magnetic coil 34 surrounding the cylinder 24 whenever this magnetic coil is energized by means of a current of electricity being passed therethrough.

When the electric current is passed through the coil the disk or armature 33 will be drawn toward the coil and against the tension of the spring 28, thus opening the inlet 29 and permitting the compressed gas which has been admitted to the chamber 30 from the pipe 23 to escape into the chamber 22 where it will open the valve 19 and pass into the explosion chamber 12 and act upon the piston 11 to move it to the opposite end of the cylinder, thus effecting a starting thereof.

The apparatus as shown in the accompanying drawing is designed to be used in connection with a four-cylinder engine, a wiring diagram of which is shown in Fig. 2. The ignition devices which control the explosion of the explosive mixture in each cylinder and the electrically controlled valves for regulating the admission of compressed air to start each cylinder are all in the same electric circuit, the electric current therefor being provided by a battery 35.

From the spark plug 17 of the cylinder 10

a wire 36 extends to a coil 37 from which a wire 38 extends to a brush 39 of a suitable distributer 40. A wire 41 branches from the wire 38 to the electrically controlled valve 34 of the engine 10. In like manner the brushes 42, 43, and 44 are connected to the coils 37 and valves 34 of the engines 10^a, 10^b, and 10^c.

Wires 45 extend respectively from the coils 37 of the cylinders 10, 10^a, 10^b, and 10^c to a wire 46 which extends to the terminal 47 of a suitable switch 48, the opposite terminal 49 of which is connected by the wire 50 to the battery 35, while the opposite end of said battery is connected by means of the wire 51 to the distributer 40. In like manner each of the valves 34 of the cylinders 10, 10^a, 10^b, and 10^c, is connected by a wire 52 to the wire 46. In the wire 52 is a make and break device 53 which is under the control of the operator and which is adapted to be operated to make a circuit so that as the distributer 40 revolves each of the coils 34 will be energized to operate its valve and admit compressed gas to the explosion chamber 12 of its cylinder.

When it is desired to place the apparatus in commission the switch 48 is operated to connect with the terminal 49 and close the circuit between the wires 46 and 50 so that as the distributer 40 revolves a current will be passed through the coil 37 and at the proper time operate the spark plug to explode the explosive mixture contained within the explosion chamber 12.

In starting the engine should either one of the cylinders contain an explosive mixture at the time of starting the ignition device will explode the same and drive the piston 11 to the opposite end of the cylinder 10. It is obvious that when this occurs and the pressure is greater within the cylinder than that of the compressed air confined within the chamber 22 or being admitted thereto, the check valve 19 will be retained upon its seat and will prevent the admission of any compressed air to the interior of the cylinder. Should there be, however, no explosive mixture within the explosion chamber 12 when the apparatus is to be started the current passing through the coil 34 will move the piston 25 against the tension of the spring 28 to uncover the inlet 29 and permit the compressed gas to pass from the source of supply through the pipe 23 and inlet 29 into the chamber 22 and cause an opening of the valve 19 against the tension of the spring 20, the compressed gas thus admitted being sufficient to force the piston to the opposite end of the cylinder and effecting a starting of the engine. The operation is repeated for the other cylinder whenever the distributer 40 contacts with either one of the brushes 39, 42, 43, and 44.

This device is particularly applicable for use on motor cars and secures a ready means of starting the engine without cranking and without moving from the seat, it only being necessary to place the switch 48 and the make and brake device 53 in a position convenient to the chauffeur so that he may operate it readily without leaving his seat. In such a case if the switch 48 be closed and an explosion occurs by means of the current passing through the ignition device the engines will be immediately started. If, however, no explosion occurs for the reason that no explosive mixture has been retained within the explosion chamber 12, then by operating the push button 53 the engine will be started in the manner described by the admission of compressed gas to the cylinder 10, causing the piston 11 to be moved to its opposite extremity.

It is believed that the operation of the invention will be thoroughly understood without further description.

Having thus described my invention, I claim:

1. In a starting device for explosive engines, the combination of a plurality of cylinders each provided with an inlet for the admission of an explosive mixture; an independent inlet to each cylinder for the admission of a non-explosive compressed gas; devices distinct from the mechanism for controlling the admission of the explosive mixture for electrically controlling the admission of compressed gas through said last-mentioned inlets; an ignition device for each cylinder; a distributer; a plurality of contact brushes coöperating therewith; and a wire extending from each brush adapted to simultaneously energize both the ignition device and compressed gas admission device for each cylinder at a predetermined time.

2. In a starting device for explosive engines, the combination of a plurality of cylinders each provided with an inlet for the admission of an explosive mixture; an independent inlet to each cylinder for the admission of a non-explosive compressed gas; devices distinct from the mechanism for controlling the admission of the explosive mixture for electrically controlling the admission of gas through said last-mentioned inlets; an ignition device for each cylinder; a distributer; a plurality of contact brushes coöperating therewith; and a wire extending from each brush adapted to simultaneously energize both the ignition device and compressed gas admission device for each cylinder at a predetermined time; and a switch in the ignition circuit adapted to control the current to the ignition devices.

3. In a starting device for explosive engines, the combination of a plurality of cylinders each provided with an inlet for the admission of an explosive mixture; an independent inlet to each cylinder for the admission of a non-explosive compressed gas; devices distinct from the mechanism for con-

trolling the admission of the explosive mixture for electrically controlling the admission of gas through said last-mentioned inlets; an ignition device for each cylinder; a make and break device in the circuit for electrically controlling the admission of the gas to said cylinder; a distributer; a plurality of contact brushes coöperating therewith; and a wire extending from each brush adapted to simultaneously energize both the ignition device and admission device for each cylinder at a predetermined time.

4. In a starting device for explosive engines, the combination of a plurality of cylinders each provided with an inlet for the admisison of an explosive mixture; an independent inlet to each cylinder for the admission of compressed gas; an ignition device for each cylinder; an electrically-operated valve adapted to control the admission of compressed gas to each cylinder; a distributer provided with a plurality of segments; and means for connecting in multiple the ignition device and electrically-operated valve of each cylinder with one of said segments.

5. In a starting device for explosive engines, the combination of a plurality of cylinders each provided with an inlet for the admission of compressed gas; an ignition device for each cylinder; an electrically-operated valve adapted to control the admission of compressed gas to each cylinder; a distributer provided with a plurality of segments; and means for connecting in multiple the ignition device and electrically-operated valve of each cylinder with one of said segments.

Signed by me at Boston, Mass., this 29th day of June, 1907.

HAROLD H. BROWN.

Witnesses:

WALTER E. LOMBARD,

EDNA C. CLEVELAND.